

What is claimed is:

1. A surface acoustic wave element comprising:  
a single crystal substrate;  
5 a buffer layer formed by a crystal film that is formed on said single crystal substrate; and  
a piezoelectric thin film having a hexagonal system or a trigonal system crystal structure that is formed on said buffer layer.
2. The surface acoustic wave element according to claim 1, wherein said single  
10 crystal substrate is a single crystal silicon substrate.
3. The surface acoustic wave element according to claim 2, wherein said single crystal silicon substrate has a face orientation of (111).
4. The surface acoustic wave element according to claim 2, wherein said buffer layer is an epitaxial film.
- 15 5. The surface acoustic wave element according to claim 2, wherein said buffer layer is formed by a rare earth oxide.
6. The surface acoustic wave element according to claim 5, wherein said single crystal substrate has a natural oxide film formed from a silicon oxide formed on a surface thereof.
- 20 7. The surface acoustic wave element according to claim 1, wherein said piezoelectric thin film is an epitaxial film.
8. The surface acoustic wave element according to claim 1, wherein said piezoelectric thin film having a hexagonal system or trigonal system crystal structure is any one of ZnO, AlN, LiTaO<sub>3</sub>, LiNbO<sub>3</sub>, or LiNb<sub>1-x</sub>Ta<sub>x</sub>O<sub>3</sub> (wherein  $0 < x < 1$ ).
- 25 9. The surface acoustic wave element according to claim 1, further comprising an

electroconductive film provided between said buffer layer and said piezoelectric thin film.

10. The surface acoustic wave element according to claim 9, wherein said electroconductive film is formed from metal or from a hexagonal system oxide.

5 11. The surface acoustic wave element according to claim 10, wherein, when said electroconductive film is formed from a hexagonal system oxide, said hexagonal system oxide is an oxygen deficient electron carrier type of zinc oxide.

12. The surface acoustic wave element according to any of claim 9, wherein said electroconductive film is an epitaxial film.

10 13. A frequency filter comprising:

a first electrode that is formed on said piezoelectric thin film or on a protective film provided on said piezoelectric thin film that is provided in the surface acoustic wave element according to claim 1; and

a second electrode that is formed on said piezoelectric thin film or said  
15 protective film, and that converts surface acoustic waves generated in said piezoelectric thin film by electrical signals applied to said first electrode into electrical signals in resonance with a specific frequency or with frequencies of a specific band.

14. An oscillator comprising:

an electrode for applying electrical signals that is formed on said piezoelectric  
20 thin film or on a protective film formed on said piezoelectric thin film that is provided in the surface acoustic wave element according to claim 1, and that generates surface acoustic waves in said piezoelectric thin film using electrical signals applied thereto; and

an oscillation circuit that is formed on said piezoelectric thin film or said  
protective film, and that includes a transistor and a resonating electrode that resonates a  
25 specific frequency component or frequency components of a specific band of the surface

acoustic waves generated by said electrode for applying electrical signals.

15. An electronic circuit comprising:

the oscillator according to claim 14; and

an electrical signal supply element that applies the electrical signals to said

5 electrode for applying electrical signals provided in said oscillator, wherein

said electronic circuit has a function of selecting a specific frequency component

from frequency components of the electrical signals, or of converting the electrical

signals into a specific frequency component, or of imparting predetermined modulation

to the electrical signals and performing a predetermined demodulation, or of performing

10 a predetermined wave detection.

16. An electronic instrument provided with the frequency filter according to claim

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